AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows:

1. **(Currently Amended)** A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a converted oscillation frequency; and

a quadrature modulation block comprising a frequency divider, a first and second multiplier, and an adder, said frequency divider receiving said converted oscillation frequency and dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees, said first and second multipliers modulating said pair of orthogonal signals with said baseband signal to output a pair of modulated signals, and said adder adding said modulated signals together to output a carrier signal,

wherein said carrier signal has a frequency different from said converted oscillation frequency and any signal frequency generated within said frequency conversion block

wherein the oscillation frequency is equal to 4/(2N+1) times the carrier frequency where N is a natural number,

wherein the frequency conversion block is adapted to multiply said oscillation frequency by a factor of (2N+1)/2,

wherein the first frequency divider divides an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees,

wherein the first and second multipliers modulate said carrier waves with a digital baseband signal to output a pair of modulated signals, and

wherein the adder adds said modulated signals together to output a digital carrier signal having said carrier frequency,

wherein said N is equal to "1", and

wherein said frequency conversion block includes a second frequency divider for dividing said oscillation frequency by a factor of two to generate a divided frequency, and a frequency mixer for mixing outputs from said local oscillator and said frequency divider to generate a first signal having a frequency equal to a sum of said oscillation frequency and said divided frequency.

2. (Canceled)

3. (Currently Amended) The quadrature modulator as defined in ~~claim 2~~claim 1, wherein said frequency conversion block further includes a band-pass-filter (BPF) for removing an image signal from said first signal.

4. (Currently Amended) The quadrature modulator as defined in ~~claim 2~~claim 1, wherein said frequency mixer is a double-balanced mixer.

5. (Previously Presented) A quadrature modulator comprising a local oscillator for oscillating at an oscillation frequency equal to 4/(2N+1) times a carrier frequency where N is a natural number, a frequency conversion block for multiplying said oscillation frequency by a factor of (2N+1)/2, a first frequency divider to divide an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees, first and second multipliers for modulating said carrier waves with a digital baseband signal to output a pair of modulated signals, and an adder for adding said modulated signals together to output a digital carrier signal having said carrier frequency, wherein said N is equal to or more than "2", and said frequency conversion block includes a second frequency divider for dividing said oscillation frequency by a factor of two to output a divided frequency, one of N frequency mixers cascaded from one another, which is connected to said second divider, outputs a signal having a frequency equal to a sum of said oscillation frequency and said divided frequency from said second divider, and each of the remaining (N-1) frequency mixers of said N frequency mixers outputs a sum of said oscillation frequency and an output frequency from a preceding frequency mixer of said N cascaded frequency mixers.

6. (Original) The quadrature modulator as defined in claim 5, wherein said frequency conversion block further includes a BPF cascaded from an N-th one of said frequency mixers to remove an image signal from said first signal from said N-th one of said frequency mixers.

7. (Original) The quadrature modulator as defined in claim 5, wherein each of said frequency mixers is a double-balanced mixer.

8. (Cancelled)

9. (Previously Presented) A quadrature modulator comprising:

a digital signal generator for generating a digital baseband signal;

a local oscillator for oscillating at an oscillation frequency equal to 4/(2N+1) times a carrier frequency where N is a natural number;

a frequency conversion block for multiplying said oscillation frequency by a factor of (2N+1)/2; and

a quadrature modulation block including:

a first frequency divider to divide an output from said frequency conversion block by a factor of two to output a pair of carrier waves having therebetween a phase difference of 90 degrees;

first and second multipliers for modulating said carrier waves with said digital baseband signal to output a pair of modulated signals; and

an adder for adding said modulated signals together to output a digital carrier signal having said carrier frequency,

wherein said frequency conversion block includes a band-pass-filter (BPF) for removing an image signal from said first signal, and

wherein an output signal from said band-pass-filter (BPF) of said frequency conversion block is supplied directly as an input signal to said first frequency divider of said quadrature modulation block,

said quadrature modulator not including a frequency multiplier.

10. (Previously Presented) The quadrature modulator as defined in claim 1, wherein said frequency conversion block includes a frequency divider for dividing said oscillation frequency by a factor of two, a frequency mixer for generating a mixed frequency signal having a frequency equal to a sum of said oscillation frequency and said converted oscillation frequency, and a band-pass filter for removing an image signal component from said mixed frequency signal.

11. (Previously Presented) A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a converted oscillation frequency: and

a quadrature modulation block for receiving a baseband signal and said converted oscillation frequency, said quadrature modulation block including a first frequency divider for dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal signals having therebetween a phase difference of 90 degrees, first and second multipliers for modulating said pair of orthogonal signals with said baseband signal to output a pair of modulated signals, and an adder for adding said modulated signals together to output a carrier signal.

wherein said carrier signal has a frequency different from said converted oscillation frequency; and

wherein said frequency conversion block includes a frequency divider for dividing said oscillation frequency by a factor of two, a first frequency mixer for generating a first mixed frequency signal having a frequency equal to a sum of said oscillation frequency and said

converted oscillation frequency, a second frequency mixer for generating a second mixed

frequency signal having a frequency equal to a sum of said oscillation frequency and said first

mixed frequency signal to output a second mixed frequency signal, and a band-pass-filter for

removing an image signal component from said second mixed frequency signal.

12. (Previously Presented) A quadrature modulator comprising:

a local oscillator for oscillating at an oscillation frequency;

a frequency conversion block for converting said oscillation frequency to output a

converted oscillation frequency: and

a quadrature modulation block for receiving a baseband signal and said converted

oscillation frequency, said quadrature modulation block including a first frequency divider for

dividing said converted oscillation frequency by a factor of two to output a pair of orthogonal

signals having therebetween a phase difference of 90 degrees, first and second multipliers for

modulating said pair of orthogonal signals with said baseband signal to output a pair of

modulated signals, and an adder for adding said modulated signals together to output a carrier

signal,

wherein:

said carrier signal has a frequency different from said converted oscillation frequency,

the oscillation frequency is equal to $4/(2N+1)$ times a carrier frequency where N is a

natural number,

the frequency conversion block multiples said oscillation frequency by a factor of

$(2N+1)/2$,

the first frequency divides an output from said frequency conversion block by a factor of

two to output a pair of carrier waves having therebetween a phase difference of 90 degrees,

the first and second multipliers are adapted to modulate said carrier waves with a digital

baseband signal,

the adder is adapted to add said modulated signals together to output a digital carrier

signal having said carrier frequency, and

said frequency conversion block includes only one frequency divider for dividing said

oscillation frequency by a factor of two to generate a divided frequency.

13-14. (Canceled)

15. (Previously Presented) The quadrature modulator as defined in claim 1, wherein said carrier

signal has a frequency different from said oscillation frequency.

16. (Canceled)

17. (Previously Presented) The quadrature modulator as defined in claim 1, wherein the

frequency divider of the quadrature modulation block receives the converted oscillation

frequency.

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REMARKS

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Claims 1, 3-7, 9-12, 15, and 17 are pending in the instant application after this

amendment cancels claims 2, 13, 14, and 16. Claims 1, 3, and 4 are amended herein. No new